

Translation of the pertinent portions of an International Preliminary Examination Report, mailed 04/13/2004

2. This report comprises a total of 10 pages, including the cover page. Attachments have also been provided.

3. This report contains information regarding the following items:

- I Basis of the Report
- IV Lack of Uniformity of the Invention
- V Reasoned Determination under Article 35(2)

I Basis of the Report

1. The following portions of the international application are considered to have been "originally filed":

Specification, pages

2, 4 to 13	in the originally filed version,
3	received 04/07/2004 with letter of 04/02/2004
1, 3a	received 04/16/2004 by telefax

Claims Nos.

1 to 23	received 04/16/2004 by telefax
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Drawings, sheets

1/5 to 5/5	in the originally filed version.
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4. Because of the changes, claims 24 to 29 are dropped.

IV Lack of Unity of the Invention

1. Upon a request for limiting the claims or to pay additional fees, Applicant has

X paid additional fees.

3. The Office is of the opinion that the requirement for unity has not been met for the reasons shown on the

attached supplemental sheet.

4. An International Preliminary Examination Report was prepared for

X all portions of the application.

V Reasoned Determination under Article 35(2)

1. Determination

Novelty	Yes: Claims	1 to 23
	No:	

Inventive Activities	Yes: Claims	1 to 23
	No: Claims	

Commercial Applicability	Yes: Claims	1 to 23
	No: Claims	

2. References and Explanations

See the supplement

Supplement

Reference is made to the following documents:

D1: USP 2,167,823
D2: DE 27 17 554 A
D3: DE 653 308 C
D4: DE 11 10 656 B
D5: USP 1,728,329
D6: DE 198 22 307 A

Re.: Item IV

The international examination authority considers that the requirements of unity described in the implementation order of PCT have not been met in the present application.

Document D1 discloses (Figs. 1 to 4) a:

device for aligning sheets transversely in relation to the sheet running direction, wherein a holding device, which transports a sheet from above, is arranged to move the sheet against a side mark, and at least two sheets are arranged above each other in a scaled manner in the sheet running direction, wherein an effective holding surface extends in the sheet running direction and is longer in the longitudinal direction than in the transverse direction, wherein three sheets are simultaneously arranged in the area of the holding device (see claim 1 in part),

and

a method for aligning sheets transversely to the sheet running direction, wherein a holding device transporting a sheet is arranged for moving the sheet against a side mark, and several sheets are arranged in a scaled manner one above the other in the sheet running direction, including the following steps:

- a sheet, which has been grasped from above, is moved transversely in respect to the sheet running direction by means of a holding device,

- at the same time, a leading end of a following sheet is transported underneath the grasped sheet in the area of the holding device (see claim 23 in part).

Therefore a first invention is seen to reside in the following special technical characteristics contained in apparatus claim 1 and method claim 23:

the holding device is embodied in the form of at least one suction roller, and the longitudinal axis of the suction roller is arranged approximately in the running direction of the sheets, and the suction roller is arranged to rotate (see claim 1 in part)

- the holding device is a suction roller, wherein the one longitudinal axis in the suction roller is approximately arranged in the running direction of the sheets, and at least one end, which trails in the sheet running direction, of an already aligned sheet, which was moved transversely to the sheet running direction, is moved away from the side mark, again transversely to the sheet running direction (see claim 23 in part).

The contribution of these special technical characteristics to the prior art can be seen in the following: the objective task of creating an alternative holding device for grasping the sheets without a clamping effect from above in a known device for aligning sheets transversely to the sheet running direction, wherein three sheets are simultaneously arranged in the area of the holding device, is solved.

2. Second Invention

Document D4 discloses (Fig. 3) a device for aligning sheets transversely in respect to the sheet running direction, wherein a suction roller which transports the sheet is arranged to move the sheet against a side mark (see claim 3 and 4 in part).

Accordingly, a second invention is seen to reside in the following special characteristics contained in claims 3 and 4:

- the suction roller is arranged to perform half a revolution per sheet to be aligned, i.e. rotating at half turns (see claim 3),

- in the circumferential direction, the suction roller has several segments with suction holes, wherein by means of suction each segment picks up a different sheet to be aligned (see claim 4).

The contribution of these special technical characteristics to the prior art can be seen to reside in the following: the problem of creating an alternative simplified arrangement of the known suction roller with an optimized movement of the roller has been solved.

3. There is obviously no connection regarding the object or its attainment between the different technical characteristics of the invention defined above in Items 1 and 2.

The requirement for unity of the invention as recited in Rule 13.1 PCT has therefore not been met, the application contains several subjects which are not connected by a single inventive concept.

Re.: Item V

1. First Invention: Apparatus Claim 1 and Method Claim 23

1.1. Closest Prior Art

Document D1 discloses (Figs. 1 to 4) a:

device for aligning sheets transversely in relation to the sheet running direction, wherein a holding device, which transports a sheet from above, is arranged to move the sheet against a side mark, and at least two sheets are arranged above each other in a scaled manner in the sheet running direction, wherein an effective holding surface extends in the sheet running direction and is longer in the longitudinal direction than in the transverse direction, wherein three sheets are simultaneously arranged in the area of the holding device (see claim 1 in part),

and

a method for aligning sheets transversely to the sheet running direction, wherein a holding device transporting a sheet is arranged for moving the sheet against a side mark, and several sheets are arranged in a scaled manner one above the other in the sheet running direction, including the following steps:

- a sheet, which has been grasped from above, is moved transversely in respect to the sheet running direction by means of a holding device,

- at the same time, a leading end of a following sheet is transported underneath the grasped sheet in the area of the holding device (see claim 23 in part).

1.2 The objective task of the first invention of claims 1 and 23 consists in creating an alternative holding device for grasping the sheets without a clamping effect from above in a device and a corresponding method for aligning sheets transversely to the sheet running direction, wherein three sheets are simultaneously arranged in the area of the holding device.

1.3 This object is attained in apparatus claim 1 in that

- the holding device is embodied in the form of at least one suction roller, and the longitudinal axis of the suction

roller is arranged approximately in the running direction of the sheets, and the suction roller is arranged to rotate.

This combination of characteristics is neither known in the prior art, nor is it suggested by it.

Although it is known to use suction rollers in place of the turntables or suction grippers in D1 for the lateral alignment of sheets, the suction rollers in D4 do not rotate (uneven movement), are not arranged from above and along the transport direction (bad transporting behavior) in D5, and in D6 are not arranged from above, so that the subject of claim 1 is not suggested. Therefore claim 1 meets the requirements of Article 33(1) PCT.

1.4 This object is attained in method claim 23 in that

- the holding device is a suction roller, wherein the one longitudinal axis in the suction roller is approximately arranged in the running direction of the sheets, and at least one end, which trails in the sheet running direction, of an already aligned sheet, which was moved transversely to the sheet running direction, is moved away from the side mark, again transversely to the sheet running direction (see claim 23 in part).

Although the method step wherein at least one end, which trails in the sheet running direction, of an already aligned sheet, which was moved transversely to the sheet running direction, is moved away from the side mark, again transversely to the sheet running direction, is known in the prior art (D2 and D3), in combination with a suction roller acting from above it is neither known nor is it suggested by it. Therefore claim 23 meets the requirements of Article 33 (1) PCT.

2. Second Invention: Apparatus Claims 3 and 4

2.1 Closest Prior Art. Document D4 discloses (Fig. 3) a device for aligning sheets transversely in respect to the sheet running direction, wherein a suction roller which transports the sheet is arranged to move the sheet against a side mark (see claim 3 and 4 in part).

2.2 The object of the second invention in claims 3 and 4 is to provide a simplified arrangement of the known suction roller with an optimized movement of the roller.

2.3 This object is attained in that

- the suction roller is arranged to perform half a revolution per sheet to be aligned, i.e. rotating at half turns (see claim 3),

- in the circumferential direction, the suction roller has several segments with suction holes, wherein by means of suction each segment picks up a different sheet to be aligned (see claim 4).

This combination of characteristics is neither known nor suggested by the present prior art.

3. Dependent claims 2 and 5 to 22 relate to further developments of independent claims 1, 3 and 4. They also meet the requirements of Article 33 (1) PCT.

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Specification

Devices for Aligning Sheets and Method for Aligning Sheets
Transversal to the Direction of Travel of the Sheets

The invention relates to devices for aligning sheets and to a method for aligning sheets transversely to the direction of travel of the sheets in accordance with the preambles of claims 1, 3, 4, or 23.

Pull guides are known in various embodiments, which pull each sheet mainly by static friction against a fixed stop - the actual side mark. After arriving there, the sheet can immediately come to rest, because the pulling mechanism, which is only in slight contact with it, continues to pull on the sheet, but the static friction immediately is switched to sliding friction.

Driven pulling rails, pulling rollers or pulling segments exist in the sheet-feeding table. If the sheet has arrived at the front marks, it is first pushed from above on the driven portion of the pulling device underneath the sheet by means of a roller, which can be precisely adjusted, is spring-loaded and is cyclically moved up and down. The length of the pull of the pull guide is always slightly greater than the scatter width of the incoming scaled layers of sheets, plus a minimum pulling length of a few millimeters up to the fixed side mark stop. The latter is adjustably fastened on the sheet-feeding table or the comb plate, depending on the sheet format and the desired lateral position of the sheets running into the printing press.

These known pull guides have the disadvantage that they

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clamp the sheet from above and below in the course of pulling it in. For this reason the pull guide must remain open at the end of the pulling operation until each sheet end has passed the pull guide line, i.e. has cleared it. Only then can the successive

orifice. It can only do so if the suction pull guide does not operate, i.e. is "open" for sheets moving up from below.

The disadvantages of the known clamping and suction pull guides for the lateral alignment of sheets could be avoided if a lateral pulling device operating from above were provided.

DE 33 05 219 C2 describes the employment of a suction pull guide for very short scale distances, operating from above.

A device for the lateral alignment of sheets is known from DE 100 55 564 A1, wherein an effective suction surface is greater in the conveying direction of the sheets than in the transverse direction.

DE 33 02 873 C2 discloses a suction gripper acting from above, which is lifted for further conveying a successive sheet underneath the sheet which is just to be aligned.

DE 11 10 656 B shows a back-and-forth pivotable suction segment for the lateral alignment of sheets.

USP 2,167,823 discloses a device for aligning sheets transversely in respect to the sheet running direction, wherein a holding device transporting a sheet is arranged to move the sheet against a side mark, and at least two sheets are arranged on top of each other in a scaled manner in the sheet running direction, wherein an effective holding surface extends in the sheet running direction, which is longer in the longitudinal direction than in the transverse direction, and wherein the holding device is arranged for acting from above on the sheet. In this case three sheets are simultaneously arranged in the area of the holding device.

3a

DE 2735 711 A1 shows a device for the lateral alignment of sheets by means of a suction strip acting from below.

DE 27 11 554 A1 and DE 653 308 C each describe a device for aligning sheets, wherein an end of an already aligned sheet trailing in the sheet running direction is again moved away from a side mark transversely to the sheet running direction.

DE 198 22 307 A1 discloses a device for aligning sheets transversely in respect to the sheet running direction, wherein a transport roller, which transport the sheet from underneath, moves the sheet against a side mark and perform $1/N$ revolutions per sheet to be aligned.

A device for the lateral alignment of sheets by means of circulating suction rollers acting from above is known from USP 1,728,329.

The object of the invention is based on providing devices for aligning sheets, and a method for aligning sheets transversely to the direction of travel of the sheets.

In accordance with the invention, this object is attained by means of the characteristics of claims 1, 3, 4, or 23.

The advantages to be gained by means of the invention lie in particular in that a suction pull arrangement, which acts from above, operates without clamping effects. It allows for the first

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Claims

1. A device for aligning sheets (10, 11, 12) transversely in relation to the sheet running direction (L), wherein a holding device (05), which transports a sheet (10, 11, 12) from above, is arranged to move the sheet (10, 11, 12) against a side mark (03), and at least two sheets (10, 11, 12) are arranged above each other in a scaled manner in the sheet running direction (L), wherein an effective holding surface extends in the sheet running direction (L) and is longer in the longitudinal direction (l05) than in the transverse direction (b05), wherein three sheets (10, 11, 12) are simultaneously arranged in the area of the holding device (05), characterized in that the holding device (05) is embodied in the form of at least one suction roller (05), that the one longitudinal axis is arranged in the suction roller (05) approximately in the running direction (L) of the sheets (10, 11, 12), that the suction roller (05) is rotatably arranged.

2. The device in accordance with claim 2, characterized in that the three sheets (10, 11, 12) are arranged between two straight lines (23, 24), which delimit the length (l05) of an effective holding surface of the suction roller (05) and extend transversely in respect to the sheet running direction.

3. A device for aligning sheets (10, 11, 12) transversely in relation to the sheet running direction (L), wherein a suction roller (05), which transports a sheet (10, 11, 12), is arranged to

move the sheet (10, 11, 12) against a side mark (03), characterized in that the suction roller (05) is arranged to perform half a rotation, i.e. make half a turn, per sheet (10, 11, 12) to be aligned.

4. A device for aligning sheets (10, 11, 12) transversely in relation to the sheet running direction (L), wherein a suction roller (05), which transports a sheet (10, 11, 12), is arranged to move the sheet (10, 11, 12) against a side mark (03), characterized in that the suction roller (05) has a plurality of

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segments with suction holes (06) in the circumferential direction, wherein each segment pulls up a different sheet (10, 11, 12) to be aligned by suction.

5. The device in accordance with claim 4, characterized in that the suction roller (05) has two segments with suction holes (06) in the circumferential direction.

6. The device in accordance with claim 3 or 4, characterized in that at least two sheets (10, 11, 12) are arranged one above the other in a scaled manner in the sheet running direction (L).

7. The device in accordance with claim 3 or 4,, characterized in that the one longitudinal axis is arranged in the suction roller (05) approximately in the running direction (L) of the sheets (10, 11, 12).

8. The device in accordance with claim 3 or 4, characterized in that the suction roller (05) is rotatably arranged.

9. The device in accordance with claim 3 or 4, characterized in that the suction roller (05) is arranged to act from above on the sheets (10, 11, 12).

10. The device in accordance with claim 1, 3 or 4, characterized in that a ratio of the effective holding surface in

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the longitudinal direction (l05) to the effective holding surface in the transverse direction (b05) is greater than 3, preferably greater than 5.

11. The device in accordance with claim 1, 3 or 4, characterized in that the suction roller (05) is arranged at a feed table (01).

12. The device in accordance with claim 1, 3 or 4,

characterized in that a rhythmically running suction roller (05) has at least one segment with suction holes (06) and a segment without holes on its circumference, and that a stationary pipe (21) is located inside the rotatably seated suction roller (05) in such a way that, for picking up by suction and lateral transport of a sheet (10, 11, 12) lying underneath the suction roller (05) by means of a narrow slit over the length of the suction roller (05), only a narrow strip of all air holes is charged with suction air.

13. The device in accordance with claim 3, characterized in that the suction roller (05) has suction holes (06) all around, rotates rhythmically or freely, and the suction air is supplied in a clocked manner through a slit-like mouthpiece (22) within the suction roller (05) and is directed downward.

14. The device in accordance with claim 1, characterized in that a sheet guide is arranged for moving sheets (10, 11, 12), whose front and side edges have been aligned, axially with constant lateral offset.

15. The device in accordance with claim 12, characterized in that the suction air strip, which is located on the bottom, is active, narrow and long, of the suction roller (05) is arranged between the tolerance strip (13) of the incoming sheets (10, 11, 12) and the offset arranged lateral edge of the outgoing sheet (10, 11, 12).

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16. The device in accordance with claim 3 or 4, characterized in that up to three sheets (10, 11, 12) are simultaneously located in the area of the suction roller (05) under it and parallel with it, even during active sheet pulling.

17. The device in accordance with claim 1, 3 or 4, characterized in that the scaled spacing of the sheets (10, 11, 12) on the feed table (01) is so close that, with an operating

suction device pulling upward, a subsequent sheet (10, 11, 12) already moves underneath the picked-up sheet (10, 11, 12) in the direction toward the front marks (02).

18. The device in accordance with claim 4, characterized in that the suction roller (05) rotates at half turns and relates to two oppositely located suction air segments, and has a slightly smaller radius between them.

19. The device in accordance with claim 1, 3 or 4, characterized in that the suction roller (05) is driven by its own motor synchronously in respect to the downstream arranged machine.

20. The device in accordance with claim 1, 3 or 4, characterized in that the driving of the suction roller (05) by its own motor synchronously in respect to the downstream arranged machine takes place mechanically via a groove shaft, which rotates transversely underneath the feed table (01) and has bevel wheels, which can be shifted.

21. The device in accordance with claim 8, 13 or 14, characterized in that the drive mechanism permits a change in format transversely in respect to the sheet running direction (L).

22. The device in accordance with claim 1, 3 or 4, characterized in that driving of the suction roller (05), which can be adjusted in accordance with the sheet format, takes place from a fixed drive point via a flexible shaft arranged above the

feed table (01).

23. A method for aligning sheets (10, 11, 12) transversely to the sheet running direction (L), wherein a suction roller (05) transporting a sheet (10, 11, 12), is arranged for moving the sheet (10, 11, 12) against a side mark (03), and several sheets (10, 11, 12) are arranged in a scaled manner one above the other in the sheet running direction (L), wherein the one longitudinal axis is arranged in the suction roller (05) approximately in the running direction (L) of the sheets (10, 11, 12), including the following steps:

- a sheet (11), which has been grasped from above, is moved transversely in respect to the sheet running direction (L) by means of a suction roller (05),

- at the same time, a leading end of a following sheet (12) is transported underneath the grasped sheet (10) in the area of the suction roller (05),

- at least one end, which trails in the sheet running direction (L), of an already aligned sheet (10), which was moved transversely to the sheet running direction (L), is moved away from the side mark (03), again transversely to the sheet running direction (L).